

Sample lesson
plans correlate to
content standards
for California public
schools K-12



TEACHER RESOURCE PACKET

ROCK THE PLANET
TOUR

Includes Free
Environmental
Education Resource
Listing and Sample
Lesson Plans

INTRODUCTION

A decade ago, California generated more than 40 million tons of municipal waste per year and was reaching capacity at many local landfills. In response, the California Legislature passed Assembly Bill 939 mandating a 50% reduction in solid waste going to landfills for all counties. Toward that effort, the County of Los Angeles Department of Public Works (“the County”) engaged in an unprecedented public outreach effort to educate county residents on the issue.

Given children’s influence on family lifestyle habits and the need to include them in reduction efforts, the County developed and implemented a comprehensive, multi-faceted outreach effort aimed at children in kindergarten through sixth grade (K-6) to educate them and their families about the importance of preventing storm water pollution and reducing, reusing and recycling (the Three R’s). Called the “Environmental Defenders,” this award-winning program has reached millions of children and their families through free school assemblies and teaching materials, community events, promotions, as well as local partnerships that reinforce the lessons of preventing storm water pollution and the Three R’s.

As a leading organization in the area of environmental education, the County has conducted extensive research on environmental education materials available nationally and has compiled this Environmental Defenders Teacher Resource Packet to support environmental education in K-6 classrooms. This packet includes:

- A resource listing of top organizations that provide environmental curricula, teaching materials, and training opportunities – often for little or no cost – for educators.
- Easy-to-use sample lessons and activities for grades K-6 that have been correlated to the Content Standards for California Public Schools K-12. These select lesson plans are ready-to-use and cover basic environmental concepts such as natural resources, recycling, water pollution prevention and household hazardous waste.

Because education is a key component in the preservation of the environment, the County applauds your efforts to encourage environmental learning in the classroom. The County hopes this Environmental Defenders Teacher Resource Packet facilitates your teaching children that they can play an important role in the health of the environment now and for generations to come.

WANT TO DEFEND THE ENVIRONMENT AT YOUR SCHOOL?

The County is pleased to offer assistance to help schools start environmental activities that can be adapted to fit your school’s needs, whether it’s help finding recycling bins or starting a larger, campus-wide environmental program. The County can also provide advice and counsel to schools regarding the planning, design and implementation of recycling, composting, waste reduction and storm water pollution prevention programs. If you have any questions, need more information or are interested in establishing an environmental program on your campus, please call the Environmental Defenders’ hotline at (310) 551-5375.



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Upon 72 hours notice, the Department can provide program information and publications in alternate formats or make other accommodations for people with disabilities. In addition, program documents are available at our main office in Alhambra (900 S. Fremont Ave.), which is accessible to individuals with disabilities. To request accommodations ONLY, or for more ADA information, please contact our departmental ADA Coordinator at (626) 458-4081 or TDD (626) 282-7829, from 7 a.m. to 5:30 p.m., Monday through Thursday.

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RESOURCE LISTING

Many environmental organizations and governmental entities have spent years developing and refining environmental curricula for elementary school students. Following are organizations with easily accessible information (via Web site or telephone) covering a range of environmental curriculum materials and training opportunities.

ENVIRONMENTAL EDUCATION RESOURCES

ORGANIZATION/CONTACT	CONTENT	DESCRIPTION	COST
California Integrated Waste Management Board (CIWMB) www.ciwmb.ca.gov or 916-341-6765	Solid waste management	Curriculum and teacher training	Free, with training
Heal the Bay www.healthebay.org or 1-800 HEAL BAY	Water pollution prevention	Curriculum and teacher training	Free, with training
Project Learning Tree www.plt.org or 916-653-7958	Water, wildlife, biodiversity and land use	Curriculum and teacher training	Free, with training
TreePeople www.treepeople.org or 818-753-4600	Ecosystems and cycles of nature	Curriculum and eco-tour	Free, with eco-tour
Water Education Foundation www.watereducation.org or 916-444-6240	Water pollution prevention	Curriculum and teacher training	Free
CA Regional Environmental Education Community Network (CREEC) www.creec.org or 916-322-9503	General environmental education	Online news and teacher resources	Free
Environmental Protection Agency (EPA) www.epa.gov/teachers/curriculum_resources.htm or 415-947-8701	Conservation and reducing, reusing and recycling solid waste	Videos, lesson plans, coloring, activities	Minimal Cost
Environmental Education on the Internet www.eelink.net	General environmental education	Activities, children's newsletter, environmental tips and trivia	Free
Think Earth www.thinkearth.org or 805-523-1040	General environmental education, natural resources, recycling, global warming	Grade-specific posters, videos and lessons	Minimal Cost
Jiminy Cricket's Environmentality Challenge www.jceckids.com or 1-800-290-0299	General environmental education	Classroom projects and student incentives	Free

SAMPLE LESSONS AND ACTIVITIES

For your convenience, a select sample of five ready-to-use environmental lesson plans have been enclosed to introduce students to the story of the environment. Beginning with natural resources and their preservation, these lessons provide basic information and fun activities that help lay a foundation for understanding key environmental concepts. Additional and more advanced lesson plans can be obtained from the resource organizations listed above.

- **LESSON PLAN #1** — “People Use Natural Resources” (CIWMB – “Closing the Loop” curriculum)
This lesson teaches students grades K-3 about the importance of identifying and conserving natural resources in order to reduce the need for raw materials.
- **LESSON PLAN #2** — “Model Community Relay Lesson” (CIWMB – “Closing the Loop” curriculum)
This lesson gives students grades 4-6 a better understanding of how reusing and recycling saves resources and reduces waste to landfills.
- **LESSON PLAN #3** — “Making Recycled Paper” (Project Learning Tree – “Environmental Education Activity Guide”)
This lesson is an entertaining, hands-on activity for students grades K-6 demonstrating the process of recycling paper.
- **LESSON PLAN #4** — “Fatal Food Relay” (Heal the Bay – “Key to the Sea” curriculum)
This lesson provides students grades 4-6 with an activity illustrating the negative impact of pollution on our waters and marine life.
- **LESSON PLAN #5** — “Keeping Clean and Green” (County of L.A. Environmental Defenders/EPA)
This lesson teaches students grades K-6 to recognize substances used in the home that may be harmful to humans and the environment.

SAMPLE LESSON PLAN #1 (GRADES K-3)

PEOPLE USE NATURAL RESOURCES

METHOD:

Students will be able to trace objects to the category of natural resources from which they were made. They will identify some of the natural resources that people need in order to live.

MATERIALS:

For “Pre-Activity Questions” and “Part I, Making ‘Earth Pockets’ ”

- Piece of butcher paper on which to record a list for “Part I, Making ‘Earth Pockets’ ”
- Two paper plates for each student
- String or yarn (approximately two feet long) for each student
- Cards (e.g., index cards or cards made from pieces of cereal box cardboard)
- Scissors
- Crayons and other art supplies
- Stapler and staples

See following page for Part II materials.

TIME:

Preparation: 30 minutes

Activity: 60 minutes to implement

Closing the Loop, a program of the California Integrated Waste Management Board, offers classroom activities and lessons for grades K-6 that help students discover and nurture an environmental ethic and stewardship for natural resources.

For more information about this lesson and Closing the Loop, please contact:

Closing the Loop
California Integrated Waste Management Board
Office of Integrated Education
2929 East Willow Street
Long Beach, CA 90806
(562) 492-9347

BACKGROUND

Humans depend on natural resources for their survival. The following describes ways people depend on natural resources.

PLANTS — Humans breathe the oxygen that plants make. Humans use plants for food, clothing and in building materials. They also use wood to heat their homes. Humans use plants to beautify an area, to keep soil from eroding and to serve as windbreaks. Many medicines are derived from plants.

ANIMALS — Humans use animals for food and clothing and to learn from and to appreciate (for aesthetic purposes). The droppings of some domesticated animals are used as fertilizer. Humans also use animal products in medicines.

SOIL — Humans use soil to grow plants for food and to build roads and buildings. They also use soil in products, such as adobe bricks.

MINERALS — Humans use minerals to manufacture thousands of different items. Silica is used to make glass; bauxite is used to make aluminum; many minerals are used to make items, such as cars, computer parts and appliances.

AIR — Humans need clean air to breathe to stay alive.

WATER — Humans need clean water to drink to stay alive. Water is also used in the manufacturing process of most products. The water might become part of the product, be used to wash items or used to cool down machinery.

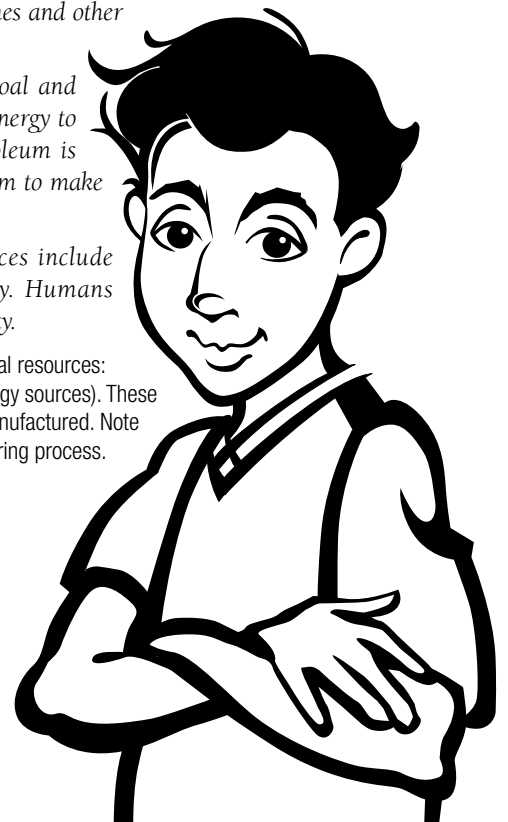
Energy Sources:

SUNLIGHT — Humans depend on sunlight, which provides energy for green plants to grow. Humans depend on green plants for food, clothing, fuel and building materials. They also need sunlight to power the water cycle so they can have fresh water to drink and to use for other purposes. Humans use solar power to generate electricity and to heat water, homes and other buildings.

FOSSIL FUELS — Fossil fuels include crude oil, coal and natural gas. Humans use fossil fuels as a source of energy to generate electricity and to move machines. Petroleum is manufactured from crude oil. Humans use petroleum to make a variety of products, such as plastics.

OTHER ENERGY SOURCES — Other energy sources include wind, hydropower, geothermal, and tidal energy. Humans usually use these energy sources to generate electricity.

Note: In this lesson we will use only four categories of natural resources: plants, animals, minerals, fossil fuels (a subcategory of energy sources). These are the natural resources from which most products are manufactured. Note that air and water are almost always used in the manufacturing process.



LESSON

People use natural resources to live and to make things.

OVERVIEW

In this lesson students will:

- **Make "Earth Pockets"** using paper plates in which the students place a string of illustrations and words that show the transformation of a natural resource into a product.
- **Work in groups to make mobiles** that represent the kinds of natural resources humans need in order to live.
- **Classify an item** based on the natural resource from which it was made.
- **Make a collage** of items made from a specific natural resource.

PREPARATION

Note: "Part I" could be completed with students in kindergarten and grade one; and "Part I" and "Part II," with students in grades two and three.

1. Read the "Background" information on page 3.
2. Make an "Earth Pocket."

Tape one end of the string or yarn to the center of the plate.

Staple the two paper plates together, leaving a 4-inch opening to make a pocket (See illustration below).

Tape or staple the other end of the string or yarn (approximately two feet long) to an illustration of a pencil on a card (e.g., cardboard from a cereal box). This card should be large enough not to fall into the pocket.

Note: It is recommended that you make cards out of used products, such as cereal boxes, to model conserving natural resources.

Further down the string, attach a card with an illustration of a piece of wood and the word "wood." This and all other cards should be small enough to fall easily into the pocket.

Attach the illustration and the word "plants."

Place the cards and attached string inside the pocket, leaving the pencil illustration sticking out of the pocket.

PRE-ACTIVITY QUESTIONS

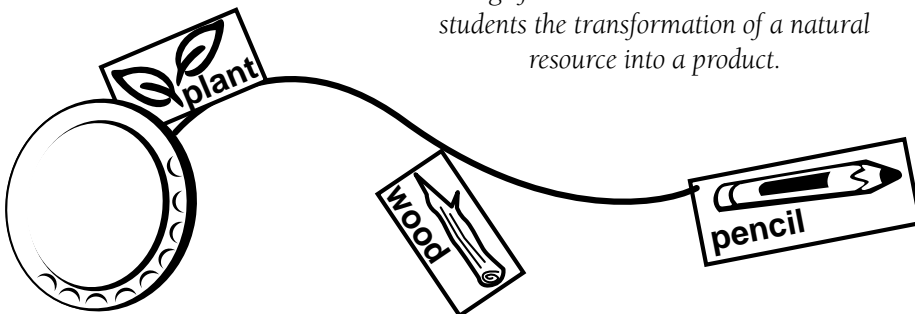
Ask students: "What things (products) do people make out of natural resources?"

List the names of some products on a piece of butcher paper and post the list in the classroom.

Tell students that they will be adding to this list during this lesson.

Continues on next page. ►

"Earth Pockets" use paper plates and a string of illustrations and words to show students the transformation of a natural resource into a product.



STANDARDS

Correlations to California's Content Standards, Grades K-12

SCIENCE

GRADE K

Investigation and Experimentation:

Scientific progress is made by asking meaningful questions and conducting careful investigations. As a basis for understanding this concept. . . students will. . . communicate observations orally and in drawings. 4e

GRADE 2

Earth Sciences: Earth is made of different kinds of materials that have distinct properties and provide resources for human activities. 3

SOCIAL SCIENCE

GRADE K

Learning and Working Now and Long Ago:

Students demonstrate an understanding that being a good citizen involves acting in certain ways. K.1

Frameworks and Benchmarks for Science Literacy

Humans use air, fresh water, soil, minerals, fossil fuels, and other sources of energy that come from the Earth. (Science Framework, page 97)

Most living things need water, food, and air. (Benchmarks for Science Literacy, page 111)

In order to participate effectively in society, students need to: Develop personal skills. . . group interaction skills (and). . . social and political participation skills. (History–Social Science Framework, page 24)

Students create original artwork based on personal experiences or responses. (Visual and Performing Arts Framework; Goal 4, page 101)

SCIENTIFIC THINKING PROCESSES

Observing, communicating, comparing, ordering, classifying

SAMPLE LESSON PLAN #1 (GRADES K-3) CONTINUED

PEOPLE USE NATURAL RESOURCES

MATERIALS:

For “Part II, Making a Mobile of the Natural Resources We Need in Order to Live,” you will need:

- Cardboard from boxes
- String or yarn
- Hole punch (a hand-held single-hole punch works best)
- Tape
- Cards (e.g., index cards or cards made from pieces of cereal box cardboard)
- Scissors
- Crayons and other art supplies

PROCEDURE

PART I, MAKING “EARTH POCKETS”

Note: The directions for making an “Earth Pocket” may need to be simplified for younger students.

- A. Show students the “Earth Pocket” (that you made in “Preparation” #2), making certain the card with the pencil drawing is sticking out of the pocket.

Ask students what the yellow part of the pencil is made from. As they say wood (and possibly lead), pull out the string to the card with the “wood” sign and illustration.

Ask where wood comes from. When students say trees, ask to which category of natural resources trees belong. They are plants. Pull out the card with plants drawn on it.

- B. Brainstorming with students, make a list of things made from natural resources that they use every day. Write these on butcher paper below the list (started at the beginning of the lesson).

- C. Select one item from the list of things used every day.

With the class, prepare an illustration of the item on a card. Then connect the card with string to an illustration of what the item is made from, down to the category of natural resources from which the item was made.

Place the cards and string inside the “Earth Pocket,” with the item sticking out.

Slowly pull out the string and the natural resource attached.

- D. Ask students to work individually and to select another item from the list of things used every day. They should then list the steps (or sources) from the natural resource to the item. Some examples include:

Book (paper—pulp—plant)
Paper (pulp—plant)
Crayon (wax—crude oil—fossil fuel)
Paper clip (steel—rock—mineral)

Milk (cow—animal)

Sweater (wool—sheep—animal)

Plastic bag (crude oil—fossil fuel)

Glass (sand—mineral)

Note: For younger students, consider having groups of five students make one “Earth Pocket.” Each student can make one part.

- E. Tell students that they will be making their own “Earth Pockets.”

Distribute two paper plates to each student.

Have students color a picture of the Earth on the bottom of each paper plate (which will become the outside of the pocket).

Help students place the two paper plates together (with the illustrated bottom of the plate on the outside) and staple them together (approximately five staples), leaving an opening of about four inches on top.

- F. Allow students to share their “Earth Pockets” with a partner or in a small group. Each student can pull out the parts slowly as other students guess what is connected to the object all the way to the natural resource from which it was made. Once students have made their presentations, they can take their “Earth Pockets” home to share with their families.

PART II, MAKING A MOBILE OF THE NATURAL RESOURCES WE NEED IN ORDER TO LIVE

- A. Discuss with students which of the Earth’s natural resources are needed by humans in order to live and how each of the natural resources will be used by humans. For example: water (to drink), air (to breathe), plants and animals (for food and clothing), minerals (from which to make things), soil (in which to grow food), energy sources (for electricity), and fossil fuels (for fuel and as a substance to make things).
- B. Help students make a mobile that shows different natural resources that people need.

- Separate students into small groups.
- Provide a piece of cardboard, yarn, cards, and art supplies.
- Assist students in making a mobile showing different natural resources hanging from strings from a piece of cardboard.

Note: For younger students, make one mobile as a class. Have several groups draw, label and color various natural resources. Have another group make the body of the mobile out of cardboard and punch holes in a row on the bottom to hang pictures of natural resources. Then the group members should write "Natural Resources That Humans Need" on the body of the mobile. The last group can attach the strings to the body of the mobile.

DISCUSSION/QUESTIONS

A. Discuss with students:

Why are natural resources important?
They provide us with things we need in order to live.

How do people use natural resources?
For making things; for producing energy; for providing the water, food and shelter they need in order to live.

Can there be shortages of natural resources for people to use? *Yes, if we use a lot of them.*

- B. Review the list, created at the beginning of this lesson, regarding things people make from natural resources and things students use every day. Ask students if they agree with the entire list. Do they want to add or delete any items? If so, ask them to explain why.

- C. List the following natural resources on the chalkboard or on a piece of butcher paper: plants, animals, minerals, fossil fuels. Ask students: "How can people make certain the natural resources they need, but that might be in short supply, will be available for many years to come?"

Plants: *e.g., reuse and recycle items made from wood; plant more plants.*

Animals: *e.g., provide places for them to live.*

Minerals: *e.g., take care of things so they will last a long time; reuse and recycle items.*

Fossil fuels: *e.g., conserve them, don't waste them; recycle items made from petroleum.*

- D. Ask what natural resources the plants need.

Have students help you make signs and illustrations for "Soil," "Water," "Air" and "Sunlight."

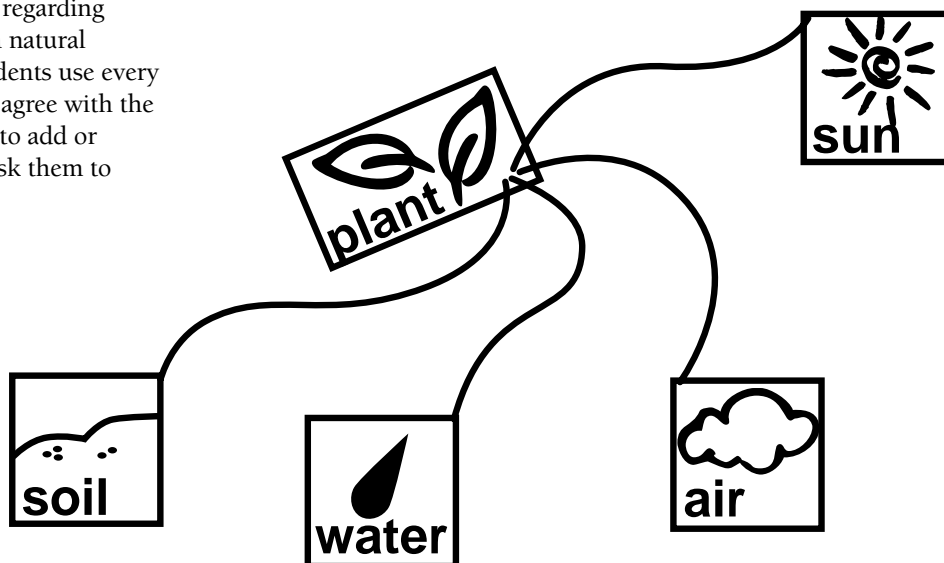
- E. Cut the plant card from the "Earth Pocket." Add four pieces of string to the "Plants." Hang on the strings the signs and illustrations of the natural resources the plants need in order to live. (See illustration.) The string can be stapled or taped on.

Based on what they just did and saw, ask students to explain additional ways people depend on natural resources. *We depend on natural resources that plants need, because we depend on plants.*

- F. Ask students to circle (on the list developed in "Discussion/Questions" section "B") those ideas they can use to conserve natural resources.

APPLICATION

- A. As a class, select a toy and trace its creation to a natural resource category.
- B. Develop a guessing game with clues that will lead students to identify an object in the classroom. For example, tell students, "I am thinking of an item that is made from plants."
- C. Show students the "Earth Pocket" you made in "Preparation Step 2": Pencil — Wood — Plants.



SAMPLE LESSON PLAN #2 (GRADES 4-6)

MODEL COMMUNITY RELAY

METHOD:

Students will be assigned to "Community" teams to compete with each other outdoors for a "Model Community" award for their planning and recycling efforts.

MATERIALS:

- One pile of 10 to 15 pieces of clean unsorted garbage for each team
- One container for recyclables
- One container for reusables
- One large container to serve as a landfill
- Model Community Award certificates

TIME:

Preparation: 30 minutes
Activity: 60 minutes to implement

Closing the Loop, a program of the California Integrated Waste Management Board, offers classroom activities and lessons for grades K-6 that help students discover and nurture an environmental ethic and stewardship for natural resources.

For more information about this lesson and Closing the Loop, please contact:

Closing the Loop
California Integrated Waste Management Board
Office of Integrated Education
2929 East Willow Street
Long Beach, CA 90806
(562) 492-9347

BACKGROUND

In 1997, California diverted approximately 32% of its garbage from the landfill through waste prevention, recycling and composting. Two percent was converted from waste to energy through incineration, while 66% was sent to the landfill. When solid waste is diverted from the landfills through recycling and reusing efforts, natural resources are conserved, energy consumption is reduced and valuable space in landfills is saved.

LESSON

For this lesson, the teacher should be ready to explain to students which items can be recycled and reused.

PRE-ACTIVITY QUESTIONS

With the pile of unsorted garbage in front of the students lead a discussion:

1. Can you name three items that can be recycled?
2. Can you name two reusable items you have at home?
3. When we put waste into a garbage can, where is it taken for disposal?

For young children you may want to sort the garbage several times as a class activity, then several more times in cooperative learning groups, before the actual relay.

PROCEDURE

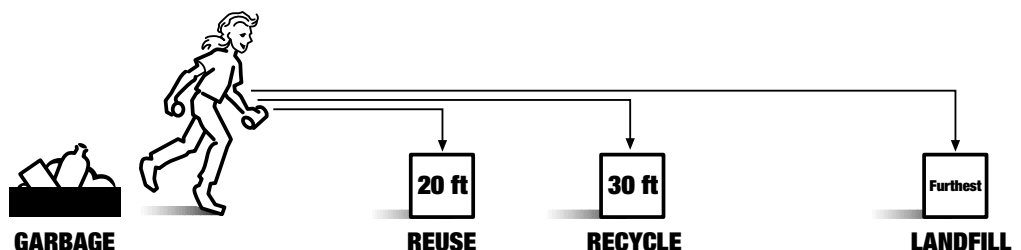
- A. Form teams of four or five students each. Explain that each team represents a community group competing for the coveted Model Community Award Certificate. This award will be presented to the first team able to deal effectively with its waste.

Encourage students to assist each other in placing materials in the correct receptacles.

- B. Set up the reuse receptacle approximately 20 feet from the starting line; the recycling receptacle 30 feet from the starting line; and the large receptacle representing the landfill as far away on the playground as is reasonably possible. This arrangement reflects the amount of energy/money required for each waste management option.
- C. Before beginning the contest, review different ways we can deal with waste.

Ask students: How does garbage get to a landfill (city garbage collection, self-haulers, etc.)? What costs are involved in getting garbage to a landfill (fuel, labor, vehicle maintenance, etc.)? What reasons would communities have for locating their landfill as far away as possible (less population, traffic, etc.)? Why is reuse closer than recycle?

- D. Make sure each team has a waste pile containing an equal number of recyclable or reusable items among the nonrecyclable and nonreusable items.



- E. Explain the rules of the game: This is a relay race in which only one person at a time from each team can put something in one of the containers and only one item at a time can be deposited. Each group should plan on how it will handle its waste in the least time, and in the most energy efficient way.

Give each group several minutes to plan its waste disposal strategy, then start the game.

Note: Use a planning sheet for the students to lay out their strategy.

- F. Monitor students' disposal choices to confirm students' claims about whether materials are recyclable. (Students may also monitor.) If students place an item into the wrong receptacle, have them take it back to the starting line, then place it into the correct receptacle. An alternative would be to not correct students until afterwards to provide an opportunity for explanation. "While some people occasionally reuse this Styrofoam cup, where does it normally end up?"

ALTERNATIVES

- Add a compost receptacle between the reuse and recycle container.
- At the end of the relay compare what was originally placed in the trash with what was sorted into the various receptacles.
- Award a certificate to each student after showing he or she effectively managed their waste by putting it into the appropriate receptacle.

DISCUSSION/QUESTIONS

When the last team finishes dealing with its waste, gather everyone together, bring the reuse, recycle, and landfill receptacles in front of the class and have a follow-up discussion.

- Ask the students what methods of waste disposal the winning team used (e.g., team members recycled and

reused materials to the greatest extent possible; team members continually sorted rather than waiting to sort before each run; team members invested more energy in waste disposal by running faster, etc.)? Review the items in the different destinations. Are the items in the reuse bin really items commonly recycled? How often are these items really reused?

Generate and rank/order a list of ways time and energy were used in dealing with the waste: sorting, running to the recycling receptacles, running to the landfill, etc. Make a bulletin board display for your classroom or a public place in the school.

- In what other ways is energy stored in waste? *It is used in the extraction of raw materials and in the manufacturing and transportation of products and packaging that become waste.*
- What do our community and county do with our waste? What have we learned from this game that might help our community and county better manage our waste?
- Present a Model Community Award Certificate to the winning team.



STANDARDS

Correlations to California's Content Standards, Grades K-12

ENGLISH — LANGUAGE ARTS

GRADE 4

Reading: Students understand the basic features of reading. They select letter patterns and know how to translate them into spoken language by using phonics, syllabication and word parts. 1.1

Listening and Speaking: Students listen critically and respond appropriately to oral communication. 1.8

GRADE 5

Reading: Students use their knowledge of word origins and word relationships to determine the meaning of specialized grade-level vocabulary. 1.1, 2.1,2.3

Listening and Speaking: Students deliver focused, coherent presentations that convey ideas clearly and relate to the background and interests of the audience. They evaluate the content of oral communication. 1.5

GRADE 6

Reading: Students use their knowledge of word origins and word relationships to determine the meaning of specialized grade-level vocabulary. 1.1

SCIENCE

GRADE 5

Investigation and Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. 6a, 6c

FURTHER STUDY

- For information about local waste prevention and recycling programs, call your city and/or county recycling coordinator.
- Visit a nearby recycling center in your community.
- Invite a community recycling coordinator to speak.

SAMPLE LESSON PLAN #3 (GRADES K-6)

MAKE YOUR OWN RECYCLED PAPER

METHOD:

By making their own recycled paper, students will discover how a paper mill recycles used paper to make new paper. They will also learn that paper is one of many products that is manufactured from renewable forest resources.

MATERIALS:

- Scrap paper (notebook paper, copy paper, or used paper bags work well; avoid glossy finishes or paper with ink, like newsprint)
- Wooden frames approximately 5" x 7" or 8" x 10" in measurement
- Nylon or wire screen and stapler
- Plastic basin at least 2.5 gallons in capacity that is larger than the frame
- Newspaper for blotting
- Blender, sponge and strainer
- Towels for cleaning up water
- (Optional: colored paper, dried flowers, and herbs)

TIME:

Preparation: 30 minutes

Activity: Two 50-minute periods (the paper you make will need to dry overnight.)

Project Learning Tree, a program of the American Forest Foundation, offers classroom activities for grades K-12 that increase students' understanding of the environment, stimulate critical and creative thinking and develop students' ability to make responsible decisions on behalf of the environment.

For more information about this lesson and Project Learning Tree, please contact:
Project Learning Tree
California Department of Forestry
and Fire Protection
P.O. Box 944246
Sacramento, CA 94244
(916) 653-7958

BACKGROUND

Paper is a mat held together by a fiber's roughness and can be made from recycled paper, cotton, flax or wood. Paper comes from trees, which are a renewable resource. Most of the trees used for paper are planted and harvested for that purpose. More than half of the fiber used for paper comes from paper which has been collected for recycling and from residues left when lumber and other wood products are made. Recycling paper is easy and can help extend the value and utility of resources. However, no matter how much paper we recycle, new trees will still be needed for paper products because paper cannot be recycled indefinitely. Each time paper goes through the manufacturing process, the fibers deteriorate. After repeated recycling (about four to six times), the fiber is no longer suitable for papermaking.

LESSON

PREPARATION

The papermaking process is a wet one, so plan to use a work space that won't be harmed by moisture and have students wear aprons, smocks or old clothing. Gather the materials indicated. Tightly staple or tack nylon or wire screening to the wooden frame, making a "deckle," which is the surface on which you will layer the pulp.

PROCEDURE

- Introduce the activity by discussing each phase of the recycling loop: collecting, processing and purchasing. Ask students if they know what happens to paper that is collected for recycling. Explain that during this activity, they will discover how a paper mill recycles used paper to make new paper.
- Remove any plastic or staples from the scrap paper and have students tear it into small pieces (approximately 1-inch squares). Fill the blender halfway with warm water, then add a handful of the small pieces of paper. Blend at medium speed until you no longer see pieces of paper, and the pulp has a soupy

consistency. You can blend in a piece of construction paper for color.

- Fill the large basin half way with warm water. Pour the pulp mixture into the large basin. Mix the pulp and water thoroughly.
- Slide the deckle into the basin. Holding the deckle under the water, gently move it back and forth to get an even layer of pulp on the screen.
- Lift the deckle out of the mixture, keeping it flat. Allow it to drip until most of the water has drained off. You should have a uniform layer of pulp mixture on the screen. (At this point, students can place dried flowers or herbs on the pulp.) Press the pulp gently with your hand to squeeze out excess moisture. Soak up any excess water dripping beneath the deckle with a sponge.
- Place newspaper on a flat surface and turn the screen paper-side-down on it. Lift the screen gently, leaving the paper.
- Cover the paper with another layer of newspaper and blot. Remove the top layer of newspaper, and let the paper dry overnight. Gently peel off the paper.

STANDARDS

Correlations to California's Content Standards, Grades K-12

ENGLISH—LANGUAGE ARTS

GRADE 4

Listening and Speaking: Students listen critically and respond appropriately to oral communications. 1.1, 1.6, 1.7

GRADE 5

Listening and Speaking: Students deliver focused, coherent presentations that convey ideas clearly and relate to the background and interests of the audience. 1.2, 1.3, 2.2

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SCIENCE

GRADE 4

Investigation and Experimentation:

Scientific progress is made by asking meaningful questions and conducting careful investigations. 6b

GRADE 5

Earth Sciences:

Water on Earth moves between the oceans and land through the process of evaporation and condensation. 3d

GRADE 6

Focus on Earth Science: Sources of energy and materials differ in amounts, distribution, usefulness, and the time required for their formation. 6b, 6c

H. When you're finished making paper, collect the leftover pulp in a strainer and throw it out, or freeze it for future use. Don't pour the pulp down the drain!

- I. To conclude the activity, discuss these questions: How is the new paper different from the old paper that you recycled? Why do you think recycling paper is important? How can you use your new paper?

ASSESSMENT OPPORTUNITIES

1. Ask younger students to explain how they made recycled paper. Have students put their new paper to use (greeting card, bookmark, etc.).
2. Ask older students to guide younger students in a papermaking activity, such as making a mural or poster on recycling and papermaking.

SAMPLE LESSON PLAN #4 (GRADES 4-6)

FATAL FOOD RELAY

BACKGROUND

Every single day one of us makes an impact on our coastal environment. Even if you live 20 miles inland, your daily behaviors and choices make an impact on our natural

coastal resources. The main reason for this situation is that our storm drain system, which was designed to protect us from flooding, has the tragic effect of transporting pollution from our streets directly to the ocean.

Our storm drains carry both marine debris and less "visible" pollution such as bacteria, viruses and toxins to the ocean. All of this pollution is harmful to the environment and the creatures that live there. There are documented cases that prove at least 267 different marine species are negatively affected by marine debris.

Adapted from Heal the Bay's "Key to the Sea"

STANDARDS

Correlations to California's Content Standards, Grades K-12

SCIENCE

GRADE 3

Life Sciences: Adaptations in physical structure or behavior may improve an organism's chance for survival. 3b, 3c, 3d

GRADE 4

Life Sciences: All organisms need energy and matter to live and grow. 2a, 2b, 3a, 3b

GRADE 3 - 5

Investigation and Experimentation:

Scientific process is made by asking meaningful questions and conducting careful investigations. (Grade 3: 5a, 5b, 5e; Grade 4: 6a, 6c, 6d; Grade 5: 6a, 6h)

SAMPLE LESSON PLAN #4 (GRADES 4-6) CONTINUED

FATAL FOOD RELAY LESSON

Adapted from Heal the Bay's "Key to the Sea"

METHOD:

Through role-playing, students will learn about environmental problems associated with trash and pollution. They will develop a greater appreciation for wildlife and environmental stewardship.

MATERIALS:

- 16 reusable lunch bags
- "Good" food: 8 plastic food critters (jellyfish, crab, seaweed, small fish, etc.). Good foods are those sea creatures naturally find in their habitats.
- "Fatal" food: 8 examples (balloons, plastic bags, six-pack rings, plastic foam, etc.). Fatal foods are those man-made products/waste that travel through the storm drain system into the ocean.
- Storm drain diagram and pictures of impacted marine organisms if available.
- Optional: Items to mark off boundary and "sick animal" area (flags or cones).

TIME:

Preparation: 15 minutes
Activity: 30 minutes to implement

Key to the Sea, a program of Heal the Bay, endeavors to provide environmental stewardship to students grades K-5 by stimulating their sense of wonder, learning and empowerment through key experiences in the environment.

For more information about this lesson and Key to the Sea, please contact:

KEY TO THE SEA
Heal the Bay
3220 Nebraska Avenue
Santa Monica, CA 90404
1-800 HEAL BAY

*Adapted from: Splish/Splash: A Big Sweep Aquatic Primer, 1992 edited by Carla Burgess, NC Sea Grant.

PRE-ACTIVITY QUESTIONS

1. What types of trash have you seen people throw onto the ground?
2. Where does the trash come from?
3. Why is it not good for this trash to end up in the ocean and on the beach?

PROCEDURE

- A. Place students into equal relay teams.
- B. Assign each team a critter (crab, sea turtle, sea lion, bird, large fish, etc.) to be and act out as they compete in the relay.
- C. Help them understand their critter. How does it walk? What should it eat?
- D. At the end of the relay course, arrange the lunch bags with the hidden food inside. Mark this area off with stakes.
- E. Tell the first student in each line to run to the end of the relay course and select a bag.

Remaining at the end, the student should secretly open the bag and show it to the instructor positioned there, but to no one else.

If the bag has fatal food in it, the student should moan, groan, and then go to the previously designated "sick animal" section.

If the bag has "good food" in it the child will walk back in the role of his/her critter to the end of his/her team's line.

All students leave their bags behind with the teacher to reposition.

- F. Repeat the activity until all children have gone or only one team is remaining. The last team left healthy is the winner.

DISCUSSION/QUESTIONS

- A. After the relay, ask the students in the "sick animal section" to reveal what made them sick and why.
A plastic bag or balloon floating in the water looks like a delicious jellyfish to a creature such as a sea turtle. Unfortunately, the plastic can get caught in their throats or stuck in their stomachs and kill them. For birds, the plastic will trick their stomachs into thinking they are full and they can starve to death. A six-pack ring or fishing line can trap or strangle birds and fish.
- B. Ask students to reflect on what specific types of trash they have seen on the beach today. Where do you think the trash came from?
People visiting the beach often leave their trash. But most trash probably came through the storm drain system. The trash you see on the ground in your neighborhood will end up at the beach.
- C. Explain how debris goes from the gutter to the catch basin through the storm drains and then through an outfall and directly into the ocean. Storm drainpipes are different from the sewer pipes that drain the water in your house. The sewer pipes go to a treatment plant.
- D. What other types of marine pollution are a problem and how do they get into the ocean?
Oil, transmission fluid, toxins and animal waste are carried to the ocean as urban runoff.
People dumping oil onto the street or into storm drains, not picking up after their pets or hosing oil down their driveways are sources of storm water pollution.
- E. How do balloons end up in the water?
What goes up, must come down! Balloons released at community celebrations, birthday parties, and the ones you let go can be deadly.

Slogan: Only let rain go down the storm drain!

SAMPLE LESSON PLAN #5 (GRADES K-6)

Adapted from County of L.A.
Environmental Defenders/EPA

KEEPING CLEAN & GREEN

HOUSEHOLD HAZARDOUS PRODUCT DANGERS, DISPOSAL AND ALTERNATIVES

BACKGROUND

What is Household Hazardous Waste?

Household Hazardous Waste is any product labeled toxic, poison, corrosive, flammable, combustible or irritant that is to be discarded. If household hazardous products are not used, stored and discarded properly, they pose a threat to the environment by polluting the air and water, and endangering human health.

Household hazardous products include but are not limited to:

- paint
- batteries
- nail polish
- nail polish remover
- turpentine
- weed killer
- bug spray
- fertilizer
- alcohol-based lotions
- expired medicine
- ammonia-based cleaners
- floor care products
- aerosol cleaners
- furniture polish
- oven cleaners
- drain cleaners
- auto body repair products
- antifreeze
- motor oil
- car wax
- shoe polish
- moth balls
- glue

Household Hazardous Waste Collection Programs

Household hazardous waste should not be thrown away in the regular garbage. The best disposal option is to use the entire product or give it to someone who can. If a product cannot be used, it should be taken to a household hazardous waste collection event. Visit www.888CleanLA.com to find a collection event in your area or call 1 (888) CLEAN LA. Safely disposing of household hazardous waste protects our environment.

Why Use Alternatives to Household Hazardous Products?

If we buy and use fewer household hazardous products or use safer alternatives, we will create less household hazardous waste and help improve the environment.

METHOD:

Students will conduct experiments to compare effectiveness of commercial cleaning products and less toxic alternatives. Through discussion, students learn how to recognize, store and dispose of household hazardous products and explore alternatives.

MATERIALS:

- Lemon juice
- Water
- Empty spray containers
- Newspaper
- Baking soda
- Sponges
- Commercial kitchen cleaning product (with ammonia, alcohol, solvent or other toxic ingredient)
- Commercial window cleaning product (with toxic ingredient)
- Optional: Cornstarch, vinegar

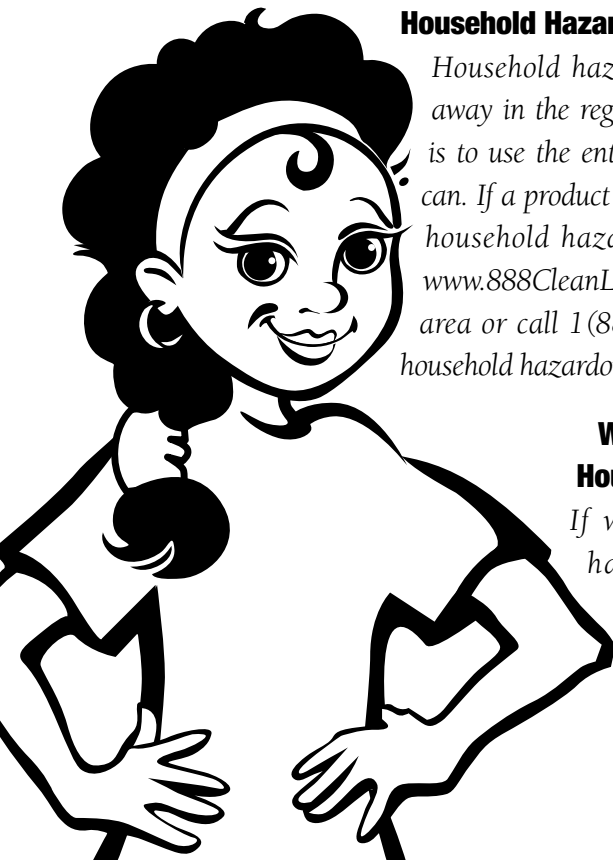
TIME:

The experiment can be conducted in one class period by the teacher or by students in groups.

The Environmental Defenders Program, the County of Los Angeles Department of Public Works' ongoing elementary school environmental education outreach program, includes a free school assembly show, teacher education component, and community outreach. The program aims to teach children to prevent storm water pollution and to practice the Three R's — Reduce, Reuse, and Recycle.

For more information about this lesson and the Environmental Defenders, please contact:

The Environmental Defenders
County of Los Angeles Department of Public Works
900 S. Fremont Avenue, 9th Floor
Alhambra, CA 91803-1331
1 (888) CLEAN LA



SAMPLE LESSON PLAN #5 (GRADES K-6) CONTINUED

KEEPING CLEAN & GREEN

How Household Hazardous Waste Contaminates the Environment

IN THE TRASH — Much of our garbage is taken to landfills. Containers of hazardous materials may break open when the garbage is compacted. Rainwater mixes with liquids and soaks through the garbage. Some hazardous materials may leak out of the landfill with the water and contaminate groundwater and surface water.

DOWN THE DRAIN — A small amount of household hazardous waste goes down the drain or is flushed down the toilet. Sewage is treated in a wastewater treatment plant. The water is cleaned as much as possible and released into rivers or lakes. Much of the solid material (which can be contaminated by cleaners and paints) is separated into a residue called sludge, which is sometimes used as a fertilizer for farm crops.

INTO THE STORM DRAIN — Some household hazardous waste is washed by storm water into storm drains or is dumped there by people. Most storm drains pour their untreated contents into nearby waterways.

DUMPING ON THE GROUND — Household hazardous waste left in ditches or on the ground can mix with rainwater and contaminate waterways and groundwater supplies.

LESSON

PROCEDURE – GRADES K-3

- A. Introduce experiment by asking students to name potentially toxic products used to clean and freshen their houses or used for yard and garden care. Explain that students can determine if a product is hazardous by reading the product label and looking for signal words such as “Danger,” “Poison,” “Warning” or “Caution.” Ask students what they should never do with these materials (e.g., play with them, eat or drink them, let siblings or pets touch them).
- B. Read labels from commercial cleaners. Discuss storage of hazardous products (away from small children, animals, heat and flame; lids on securely; clearly labeled, etc.). Discuss how household hazardous materials can contaminate the environment (see background section). Explain to students that many hazardous products can be replaced by safer alternatives.
- C. Ask students what lemon juice and baking soda are normally used for. Explain that, although these products are normally used in cooking, they also can be used as ingredients in cleaners. Tell students that they are going to create their own cleaners.
- D. Divide class into small groups and assign each group the task of cleaning

desks or washing windows. Give each group the appropriate recipe (see safer alternative recipes on this page), ingredients and necessary materials to complete the task. Have each group clean using the commercial product, then the natural alternative.

- E. Ask each group to report the results to the class. Ask the class to compare the results of using the commercial products and the safer alternatives.

PROCEDURE – GRADES 4-6

Conduct same experiment listed above.

- A. Have students create magazine or billboard advertisements that would appeal to kids their own age and motivate them to use safer alternatives to household hazardous products. Encourage students to be creative and even develop catchy taglines or ad copy that conveys the message clearly and concisely. Have students share their advertisements with the class.

DISCUSSION

What are some advantages of using the safer alternatives? *They are safer for you and the environment and less expensive.*

Is the household hazardous waste as harmful to the environment if it is disposed of properly? *No.*

How do we dispose of household hazardous waste? *To learn about collection events for disposal, visit www.888CleanLA.com or call 1(888)CLEAN LA.*

ALTERNATIVES TO HOUSEHOLD HAZARDOUS PRODUCTS

- **SCOURING POWDER** — Sprinkle baking soda on a damp sponge. Rub the desk with the sponge and rinse with a wet rag.
- **WINDOW CLEANER** — Mix one tablespoon lemon juice with one quart of water. Add to spray containers. Apply to surface and dry with newspaper. Or add ¼ cup vinegar and one teaspoon cornstarch to ½ gallon warm water for another effective cleaner.
- **DRAIN CLEANER** — Mix ¼ cup vinegar and ¼ cup baking soda. Pour mixture down drain. Let stand for a few minutes and rinse with boiling water.
- **COPPER CLEANER** — Apply warm vinegar and salt with a soft cloth. Rinse with water.
- **JEWELRY CLEANER** — Rub on a small amount of toothpaste, rinse and polish with a soft cloth.
- **PESTICIDE** — Weed the garden; import predators (lady bugs, etc.) to eat pests.

STANDARDS

Correlations to California's Content Standards, Grades K-12



ENGLISH—LANGUAGE ARTS

GRADE K

Listening and Speaking: Students listen to and respond to oral communication. 1.2

GRADE 1 – 4

Listening and Speaking: Students listen critically and respond appropriately to oral communication. (Grade 1: 1.1, 1.2; Grade 2: 1.1, 1.2; Grade 3: 1.1, 1.2, 1.3; Grade 4: 1.1, 1.2, 1.6, 1.7)

GRADE 4

Writing: Students write clear and coherent sentences and paragraphs that develop a central idea. Their writing shows they consider the audience and purpose. 1.1, 1.3

GRADE 5

Reading: Students use their knowledge of word origins and word relationships to determine the meaning of specialized grade-level appropriate vocabulary. 1.1

Writing: Students write clear and coherent sentences and paragraphs that develop a central idea and exhibit students' awareness of the audience and purpose. 1.1, 1.3

Listening and Speaking: Students deliver focused, coherent presentations that convey ideas clearly and relate to the background and interests of the audience. 1.1, 1.3, 1.4, 1.7, 1.8

GRADE 6

Reading: Students use their knowledge of word origins and word relationships to determine the meaning of specialized grade-level appropriate vocabulary 1.1

Writing: Students write clear, coherent, and focused essays that exhibit students' awareness of the audience and purpose. Essays contain formal introductions, supporting evidence and conclusions. 1.1, 1.3

Listening and Speaking: Students deliver focused, coherent presentations that convey ideas clearly and relate to the background and interests of the audience. They evaluate the content of oral communication. 1.1, 1.2, 1.4, 1.6, 1.9, 2.4

SCIENCE

GRADE K

Physical Science: Properties of materials can be observed, measured and predicted. 1a

GRADE K, 1, 2, 6

Investigation and Experimentation: Scientific progress is made by asking meaningful questions and conducting careful investigations. (Grade K: 4b, 4e; Grade 1: 4a; Grade 2: 4c; Grade 6: 7e)

GRADE 3, 5

Life Sciences: Adaptations in physical structure or behavior may improve an organism's chance for survival. (Grade 3: 3c; Grade 5: 6g)

Please visit the brand new
Environmental Defenders
Web site,
www.888cleanla.com/defenders

**ENVIRONMENTAL DEFENDERS
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